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men. The knowledge which he displayed, and the value and simplicity of the improvements which he proposed, secured the universal adoption of his suggestions and crowned him with a success altogether unparalleled in the annals of science.

Notes on the Flora of Eastern Virginia.

LESTER F. WARD.

While engaged in making a geological reconnaissance through the State of Virginia, and as far south as the Roanoke river in North Carolina, during the month of August of the present year, I made a few botanical notes, usually without collecting specimens, except where the plant was doubtful or specially desirable. The terrain to be studied forms a narrow belt, rarely over fifteen miles in width, and extends in a direction slightly west of south from Washington, following the Potomac river as far as Aquia Creek, passing through Fredericksburg, Richmond and Petersburg, from which point it was barely traceable to Weldon, North Carolina. It is the newer or younger Mesozoic of Rogers and Fontaine, or Potomac formation of Mr. W. J. McGee, of the United States Geological Survey, and contains several beds of fossil plants which were the special object of my investigations.

My familiarity with the flora of Washington and vicinity rendered it both easy and interesting to note the more conspicuous changes which the flora undergoes in passing southward, and my notes were almost wholly confined to this aspect of the question. They were usually taken from the carriage, without stopping to make special researches, and it is therefore very evident that the species enumerated below can form only a small part of the whole number, which a thorough investigation of the localities named would show to exist as marking the differences between the flora of those localities and that of Washington. It was, moreover, impossible to note the absence of Washington species, although in a few cases this was quite conspicuous. Where species rare at Washington became common, the fact was noted as well as that of the appearance of entirely new forms. The arboreous vegetation, as being the most striking as well as the most important, naturally claimed special attention, but the more humble forms were not overlooked. Meager as my notes are, however, I find it necessary to omit many minor points, in order to restrict this article to such limits as I presume to be suitable to the pages of the GAZETTE.

I was much interested in the specimens seen of *Quercus Michauxii* Nutt., which, indeed, occurs near Washington, but very sparingly and in such doubtful forms that I had almost felt obliged to apologize for its introduction in the Flora of Washington. The most northerly point at which typical specimens were seen was on Powell Run, the first stream north of the Quantico. Here a fine tree was found, and fruiting specimens collected. Some of the lower leaves are scarcely distinguishable from those of *Q. Prinus*, while the upper ones show considerable analogy to those of *Q. bicolor*, to which species the tree is, of course, most closely allied. In the valley of the Pamunkey, near Hanover Court House, this species is very abundant, and the trees attain a great size. The resemblance to *Q. bicolor* is less close, the leaves not being at all lyrate or whitened underneath. After a thorough examination of it from this point southward, I conclude that while Dr. Engelmann certainly had some grounds for uniting it with *Q. bicolor* as a variety, there are still better ones for keeping it distinct.

The behavior of the pines furnished a constant subject of observation. Besides the rare *Pinus pungens*, not seen further south, the only pines thus far met with in the Washington flora are *P. mitis*, *P. rigida* and *P. inops*. These are about equally abundant, except that where any considerable forests of pine occur, they are always composed almost exclusively of *P. mitis*. A very large part of eastern Virginia and North Carolina, probably one half of the territory, is grown over with pines. The land has been once under cultivation, but long abandoned, and the forests often consist of large trees, between which in many cases the furrows are distinctly visible. In the vicinity of Washington, and especially in Maryland, *P. rigida* plays the role, to a considerable extent, of an "old field pine," but *P. inops*, the scrub pine, grows in similar situations. As one proceeds southward both these species grow more rare, *P. rigida* almost completely disappearing before the Rappahannock is reached. It was in the vicinity of Fredericksburg that I saw the first traces of the long-leaved pine, *P. Tæda*. These appeared in the form of occasional young growths around the margins of groves of *P. mitis*. It is a singular fact that the leaves of these small bushes or trees were much shorter than the normal length for the species, while, as I have always observed, the leaves of young trees of *P. mitis* are generally longer, often considerably longer, than the normal length. The effect was to obscure the fact of the gradual appearance of the former species. One might almost think that a partial hybridization was going on. Nowhere on

the Rappahannock did I see a cone-bearing tree of the long-leaved pine, but there can be little doubt that sufficient research would reveal a few from which the seeds had come that produced the seedlings observed. A little further south, however, after crossing the Massaponax river, such trees began to be seen. They first occurred around the edges of yellow pine forests, as if struggling for admission, next as encircling borders to such forests, a few trees penetrating some distance inward. Still further southward the obvious struggle between the two species becomes more fierce, but to the evident disadvantage of *P. mitis*. The *Tædas* close in and share the ground equally, the margins of woods consisting entirely of them. Finally, as we approached the James and Appomattox rivers the yellow pines had generally disappeared, and the timber consisted almost exclusively of *P. Tæda*. It was only where this was the case that this species assumed the character of a distinctively "old field pine." I had expected to see it come in as such, but this was not the case. In these more southern districts, however, where vast forests of it exist, loblollies, having the typical form of top, stand out in the old fields with all the characteristics that are so often described. But it is proper to say that within the forests this tree presents none of these characteristics. It is tall, straight and symmetrical, having none of the small horizontal limbs, so characteristic of *P. mitis*, growing from the lower part of the trunk of the smaller trees. The trees when large stand well apart, the interspaces being devoid of shrubby undergrowth, and the appearance of one of these older forests is highly imposing. It is almost the only pine of this part of southern Virginia and northern North Carolina, no specimens of *P. australis* having been met with. It is also the only species of pine I have ever seen in the Dismal Swamp where it penetrates to Drummond Lake.

Ulmus alata, the winged elm, was first seen on the South Anna river, but it soon became common and remained so to the Roanoake. On the Chickahominy, James and Appomattox it is a small tree, but the specimens planted in the state capitol grounds at Richmond have attained a large size, and form graceful shade trees. The largest trees seen were in the valley of Fontaine's creek, near the state line, some of which had a diameter of nearly two feet.

Quercus aquatica was very closely associated with the last, being first seen near Ashland, 17 miles north of Richmond, and becoming more abundant southward. The foliage is quite constant, being even less variable than that of most oaks. It is entirely different from any of the forms of *Q. heterophylla* that I

have ever seen, and I can not admit for a moment that the latter is a form of it.

The above are the principal trees in the range of which I was specially interested. The following herbs and shrubs either rare in or absent from the Washington flora were noted and may convey some idea of the unceasing interest and pleasure which a botanist must derive from a journey through that part of the south.

Rubus cuneatus, rare near Washington, steadily increases in abundance from the Accotink to the most southerly point reached, gradually supplanting *R. villosus*, and becomes very rare in southern Virginia. The berry, which is scarcely edible further north, becomes plump and very sweet, and on several occasions our party halted to enjoy a feast of them from the bushes. In the valley of the Nottaway river this species has the habit of the northern blackberry and forms dense brambles along the fences, some of the bushes growing to the height of six or eight feet.

Nelumbium luteum has never been found in a wild state near Washington, but does well in artificial ponds. I was surprised, therefore, rather by its abundance than by its presence in the Quantico creek. This estuary, as well as that of Aquia creek, is filled with it, and as we happened to be there at the right season to see it in flower, we enjoyed a grand sight. It is perfectly well known to the inhabitants of this part of the state by the name of *Wankapin* (if this is the correct spelling), the first vowel having the same sound as in *want*. As it is the Water Chinquapin of other localities one might surmise that this name was a contraction of the latter, but no one knows it by this more accepted name and it is more probable that *Wankapin* is an original Indian name. This plant, so abundant in the tidal estuaries of the Potomac, was not seen in those of the James or Appomattox, nor did we meet with it at any inland point on our route.

Liatis squarrosa was found at Brooke Station below Aquia creek and numerous points further south.

Helianthus atrorubens occurs some distance north of the Rapahannock and from this point to the Roanoake it was common, often abundant.

Phragmites communis was seen on the Tapony, six miles above Bowling Green, also near Chester, twelve miles south of Richmond, and again on the Meherrin.

Eupatorium feniculaceum first appeared in the vicinity of Stafford Court House and became a constant companion throughout southern Virginia.

Vitis vulpina, of which a single vine was seen near Mount

Carmel Church, was rare at Fredericksburg, but soon became common and is the principal grapevine of the South.

Chrysopsis graminea, first seen on the Tapony, above Bowling Green, side by side with the more northern species, *C. Mariana*, gradually takes the place of the latter as you go southward, until from Richmond on it becomes very abundant and almost omnipresent.

Clethra alnifolia, although it extends much further north and has lately been found north of Washington, near Bladensburg, Md., was not encountered until we reached the tributaries of the Mattapony. From here it rapidly grows abundant and in southern Virginia often lines the roadside for miles. As we happened to strike it in its best flowering state we had an opportunity to enjoy the fragrance as well as the beauty of its flowers.

Clitoris Mariana, which is a rarity here and is much sought by lovers of wild flowers, was found at Milford Station blooming in wild profusion along the railroad and in the fields and meadows, where it climbs up the tall weeds and stalks of corn. It was found in the same abundance at nearly all points along our route to Weldon, North Carolina.

Sabbatia lanceolata was collected near Ashland, about seventeen miles north of Richmond. It was seen at one or two more southerly points.

Rhynchospora corniculata was found literally filling small, partially dried ponds at two points south of Richmond, one only five miles from that place, the other near the Rowanty creek, twenty miles south of Petersburg.

Bignonia capreolata was first seen on the James near the Dutch Gap canal. It was common enough there to be known to the inhabitants, who call it the Quarter-vine, from the fact that by a little twisting the stems will cleave longitudinally along the planes whose cross-section gives the well-known "cross" which has caused it to be called the "Cross-vine." I found by experiment that this was the case, and if it has not already been done, the peculiar character of these specialized medullary rays would undoubtedly well repay a careful investigation. The plant was still more common further south.

A small patch of the northern *Myrica asplenifolia* was found at Ware Bottom Mills, on Trent's Reach, the great bend of the James that was cut off by the Dutch Gap canal, and I thought this southerly position remote from mountains somewhat remarkable and worthy of record.

Diodia Virginica was first seen at the point last mentioned, below which it grows more abundantly.

Silphium compositum was observed near Swift creek, about six miles north of Petersburg, and became abundant on Stony creek and between the Nottaway and the Meherrin. As this species has not been previously reported north of the southern boundary of Virginia this constitutes a considerable addition to its northward range. It is so abundant all through the southern half of Virginia that it is strange that this fact should have remained so long unknown, and this and many other things indicate that very little botanical work has been done in this region.

Polygala Curtisii, var. *pycnostachya* was found at various points; near Swift creek, at Jarrat's, below the Nottaway (where good albinos were collected), on Three creek, etc. It proves to be a very common form and to range far southward. I have a specimen from Capt. John Donnell Smith, collected at Buck Forest, Transylvania county, North Carolina, and another from Dr. Chas. Mohr, collected by E. A. Smith, at Mobile, which, though labeled "*P. fastigiata*??," can be none other than our plant. Dr. Mohr suspected as much and wrote on the label "*caruncle sparsely hairy, as long as the stalk, but different in the persistent bracts. Is it Curtisii?*"

Aster gracilis was seen five miles north of Petersburg, and at several points between the Appomattox and the Roanoke. It grows in sandy, open ground in small dense patches, its habit being much that of a *Sericocarpus*, closely resembling *S. solidagineus*, except in its blue flowers. It agrees perfectly with Martindale's specimen from the New Jersey pine barrens, which is the only one I had seen.

Passiflora incarnata was not observed north of Petersburg, but at that place it is quite common, and in the valley of the Nottaway it becomes a weed of the cornfields injurious to the crops. It was still flowering abundantly towards the end of August, and was also in full fruit. The inhabitants know it by its fruit as "maypops," and do not understand the term "passion flower."

Paspalum Floridanum was found at points a few miles both above and below the Appomattox, and also on the Nottaway growing very tall (five to six feet) and stout. It seems to follow the cotton and pea-nut ("goober") belt of low sandy country.

Spiraea tomentosa was collected near Jarrat's below the Nottaway, and not elsewhere seen.

Parthenium integrifolium was common from above Rowanty creek to the Roanoke.

Sarracenia flava was found and pitchers brought to me by

Mr. W. J. McGee, of the party, from a swamp in a pine wood, two miles north of Rowanty creek.

Jatropha urens, var. *stimulosa*, becomes a common plant from the Rowanty creek southward.

Tephrosia spicata was found at Bolling's Bridge, over the Nottaway, as a kind of vetch in the fields.

Desmodium strictum, one or two young flowering plants, was also collected in the vicinity of Bolling's Bridge.

Breweria humistrata was found on the Nottaway, in a dense pine wood, trailing and climbing over the smaller undergrowths and blooming profusely, a delicate and handsome vine.

Elephantopus tomentosus, which replaces *E. Carolinianus* of the northern districts, was first seen in the Nottaway valley, and became quite frequent as we traveled southward.

Cyrilla racemiflora was first seen on Falling Run, about three miles south of Hicksford, and once more near the state line in North Carolina. It was unfortunately then (August 18) out of flower.

Pluchea camphorata was seen between the Meherrin and Fontaine's creek.

Arundinaria macrosperma, which occurs sparingly on the Nottaway, forms a constant feature of the low ground along Fontaine's creek, near the state line, and is abundant from that point southward.

The principal new forms noted in North Carolina, which were not seen in Virginia, were *Senecio tomentosa*, *Baptisia villosa* (in fruit), *Carex glaucescens* (I once collected this at Norfolk, Va.), and *Amorpha fruticosa*.

After our return to Washington, the reconnoissance was extended to Maryland.

Eupatorium serotinum, which has never been found in the District of Columbia, is one of the most abundant plants along the Patuxent, above and below Marlboro, a distance of less than twenty miles.

Centrosema Virginianum was also found growing in the deep sands that now cover the wide tract east of the Patuxent, across which the bed of that stream has been shifting since the tertiary epoch.